MIOW+ - a model to assess business economic consequences of environmental measures: The Manual

van der Woerd, K.F.; Dellink, R.B.; Boelens, J.J.M.; van Rijn, I.A.W.

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A model to assess business economic consequences of environmental measures

K.F. van der Woerd, R.B. Dellink, J.J.M. Boelens and I.A.W. van Rijn

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IVM

Institute for Environmental Studies
Vrije Universiteit
De Boelelaan 1115
1081 HV Amsterdam
The Netherlands

Tel. ++31-20-4449 555
Fax. ++31-20-4449 553
E-mail: secr@ivm.vu.nl

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Preface

This is the manual for the computer program MIOW+. The program was developed at the Institute for Environmental Studies and the Economic and Social Institute of the Vrije Universiteit in Amsterdam, the Netherlands.

Aim of the program is to give a (theoretically justified) framework for analysis of the financial consequences of business environmental plans, to be used independently by companies or the relevant authorities.

Main financier of MIOW+ were the Dutch province of Gelderland, the other Dutch provinces and the Ministry of Transport, Public Works and Water Management (RWS-RIZA). The program has greatly benefited from the co-operation of five test companies, the Chambers of Commerce Gelderland and the Chemical Industry.

The authors like to thank all involved in the making of MIOW+ for their pleasant co-operation and supportive criticism. Special thanks to Enno Masurel, Saskia Rosdorff and Yvonne van Everdingen for their expertise, and Josje Hofland (at Aqua Text) and Bregje Stomph for the translation of this document. Of course, the usual disclaimer applies.

Frans van der Woerd

Rob Dellink

Jos Boelens

Ingrid van Rijn

1. Introduction

This chapter describes in general terms what MIOW $^{+}$ is and how it may be used.

The use of MIOW^{+}

The MIOW^{+}-method is an instrument to analyse the financial effects of future environmental measures for individual companies. MIOW^{+} is an improved version of the MIOW-method from 1986. Environmental measures can be assembled in a business-environmental policy plan (BEPP), which companies make up as part of sectoral covenants. However, this is not essential, as every cost price raising environmental measure can be used within MIOW^{+} for financial analysis.

Within the MIOW^{+}-method the estimated additional environmental costs are compared to the current and expected financial situation without additional environmental measures. This means that MIOW^{+} gives an opinion on the influences of the environmental costs on the continuity of business. The financial situation is characterised by means of a number of internal and external indicators. The weighted average of the internal indicators results in a score for Resilience and the average of the external indicators results in a score for Market Situation. The essence of the method is that the values of Resilience and Market Situation determine the possibility to absorb extra environmental costs internally, or to transfer them to clients.

MIOW^{+} is a means to get as objective a view as possible of the financial position of an individual company, looking ahead to the next four years. Completing the questionnaire as well as interpreting the results demands financial expertise. An expert opinion is necessary, particularly with regard to future developments. The same goes for the assessment of the competitive position. It is recommended that the results of MIOW^{+} be used as a starting point for negotiations between the company and the authorities.

Whether or not a company is doing well is not assessed the same way across sectors.The valuation of the internal indicators in particular depends upon the production process, the build-up of cost price and the place in the product column. For instance, there are significant differences between industry, trade and services.

In its current form, MIOW^{+} focuses on middle-large and large industrial companies. Using MIOW^{+} for companies outside these sectors and for small companies (less than 50 employees) is possible, only if the results of the computer program are looked at critically.

General set-up of MIOW^{+}

In figure 1.1 the general set-up of the MIOW^{+} method is depicted. The basic building stones for MIOW^{+} are a number of internal and external indicators. The internal indicators determine, through a weighted average, the internal Resilience score in the past, present and future. By comparing the actual score for Resilience with fixed standards, an assessment can be made whether Resilience is within a safe (‘green’), unsecure (‘orange’) or unsafe (‘red’) zone.

The external indicators determine the score for Market Situation. The score for Market Situation in turn determines the possibilities to transfer the additional environmental costs to clients. If (some) environmental costs can be transferred to clients, the gross environmental costs decrease

to net environmental costs. These net environmental costs have a (negative) impact on the internal indicators and hence on company Resilience.

Finally, the score for Resilience **including** the environmental measures can be compared with the Resilience **excluding** the environmental measures. In this way insight is gained into the influence of the environmental measures on company continuity.

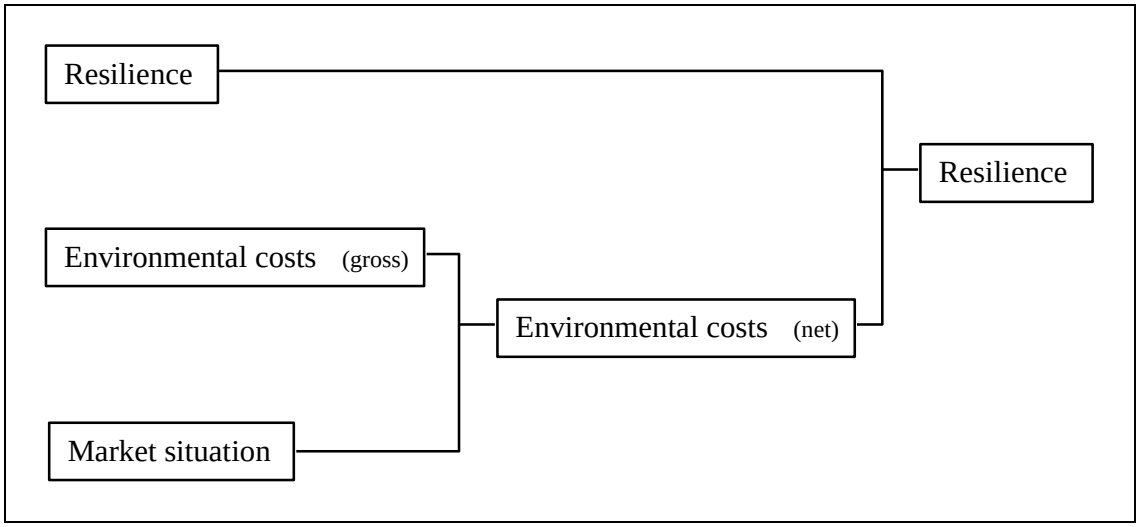


Figure 1.1 Set up of the model

Scores for indicators, Resilience and Market Situation

For the individual indicators as well as for Resilience and Market Situation MIOW$^+$ uses scores: values are transferred to scores between 1 and 5, using fixed critical boundaries. A score of 1 indicates that the value of the indicator can be described as 'very bad'. Analogously, a score of 2 means 'bad', a score of 3 'reasonable', a score of 4 'good and a score of 5 'very good'. The final score for Resilience can be transformed into a 'red', 'orange' or 'green' zone. The final score for Market Situation can be transformed into similar zones with accompanying cost transfer percentages for the environmental costs. Table 1.1 gives the description of the zones that are used in MIOW$^+$, and the accompanying critical boundaries.

Table 1.1 Zones for Resilience and Market Situation

Resilience	Market Situation
score < 1.5	score < 2.5
unsafe or 'red'	cost transfer percentage = 0%
score 1.5 - 2.5	score 2.5 - 3.5
unsecure or 'orange'	cost transfer percentage = 25%
score > 2.5	score > 3.5
safe or 'green'	cost transfer percentage = 50%

Calculation of environmental costs

The (gross) environmental costs in MIOW$^+$ are determined by the following characteristics of the individual environmental measures:

1. environmental investments; and
2. changes in operating costs and income.

Yearly capital costs are calculated from the environmental measures using the following assumptions:

- construction investments are depreciated in 25 years;
- electro-mechanical investments are depreciated in 10 years; and
- nominal interest rate is 8%.

Together with the changes in operating costs and income the capital costs make up the (gross) total annual environmental costs.

Effects of environmental costs on Resilience

The calculation of the effects of the environmental costs on Resilience is done in two steps:

Step 1: The gross yearly environmental costs are transferred to net yearly environmental costs. The cost transfer percentage is determined using the score for Market Situation. For example, if the score for Market Situation is 3.2, the cost-transfer percentage is 25% (see table 1.1), and hence the net environmental costs are 75% of the gross environmental costs.

Step 2: The net environmental costs have a threefold impact on the financial accounts in the base year:

- the tangible fixed assets increase with the amount of the total environmental investments;
- the long-term debt increases with the amount of the total environmental investments; and
- the total operating costs increase with the amount of the net annual environmental costs.

The changes in the financial accounts lead to new values and scores for the internal indicators and a new value and score for Resilience.

The manual and computer program

MIOW$^+$ is an interactive computer program, that can be run on a Personal Computer under Windows 3.x and Window 95. This manual clarifies the computer program. Besides a description of the set-up of MIOW$^+$ and its indicators, the user will find an explanation of how to complete the questionnaire and how to the interprete of the MIOW$^+$-results.

Alongside this manual and the computer program the report 'MIOW$^+$ - achtergrond bij het model' (in Dutch only; 'MIOW$^+$ - background to the model') is available from IVM. This report gives the scientific justification for the model set-up of MIOW$^+$. For the user of the computer program this report is not essential: he or she will find all the relevant information in this manual and the computer program.

Contents of the manual

In chapter 2 the technical usage of the computer program is discussed (including instructions for installation). In addition, chapter 2 contains general tips and hints on how to work with the program.

Chapters 3 to 7 contain a discussion of the various MIOW$^+$-windows:

- internal indicators to calculate Resilience (chapter 3);
- external indicators to calculate Market Situation (chapter 4);
- international competition as background to the Market Situation (chapter 5);
- environmental measures to calculate the yearly environmental costs (chapter 6);
- standard effects of yearly environmental measures (chapter 7).

Chapter 8 discusses the interpretation of the (standard) results of MIOW$^+$. It points to the pitfalls of conclusions that are drawn too hastily or in too absolute terms. It concludes with some recommendations on sensitivity analysis.

When completing the questionnaire it is recommended that the user consult chapters 3 to 6. For analysis and interpretation of the results chapters 7 and 8 are important. For convenience, Appendix 2 presents a company report of a fictitious company ‘Demostra’.

2. The computer program MIOW$^+$

This chapter describes how the MIOW$^+$ computer program can be installed and used. Explanation of the MIOW$^+$-method and the interpretation of the figures is given in the following chapters.

System requirements

The program requires a 386, 486 or Pentium PC. At least 4 Megabyte of hard disk space should be available. Furthermore, 4 Megabytes of RAM-memory is needed; 8 Megabytes is recommended. This program runs under Windows 3.x or Windows 95.

General hints for new Windows users

'Click' means: "briefly press the left mouse button". 'Double click' means "click the left mouse button twice in a row. Double clicking requires a certain skill. An alternative is to click once and then press <Enter>. "Drag" means hold down the left mouse button while moving the mouse". Dragging is used, for example, to select pieces of text to delete, copy or move.

A field on the screen can be filled out by first clicking on the field and then typing the text or number. An alternative for clicking is jumping from field to field by using <Tab> or <Enter>. When changing an existing text it is possible to select the whole text (or a part of it) and to overwrite. To do this, drag the mouse across the entire text (or a part of it) within the field and type the replacing text. To fit in additional text is even simpler: click on the desired spot within the existing text and type the additional text.

Installation

When the PC complies with the requirements installing MIOW$^+$ goes as follows:

1. When not yet in Windows and the DOS-prompt is showing (for example, 'C:\>'):

Type WIN followed by <enter> after DOS-prompt.

Several windows will appear, one of which is the Program Manager window. At the top of this window there is a menu bar, and one of its options is File.

2. *Click on of the Program Manager's File menu and click on the option Run.*

The Run window appears.

3. *Put disk one of MIOW$^+$ into drive A:*

4. *Type A:\SETUP.EXE and click on the OK button.*

The installation of the program starts now. After a while a window appears in which the desired directory can be indicated.

5. *Click on the OK button*.

After a while the program will ask for the second disk.

6. *Put disk two of MIOW$^+$ into drive A:*

This step completes the installation and the program is now ready for use.

Starting MIOW$^+$

The MIOW$^+$-program is started by double clicking on the icon 'MIOW$^+$'. The Main window appears on screen.

Explanation of icons

The MIOW$^+$-program uses icons instead of text. They are explained in the following section.


Close a current window and return to the Main window. On the Main window this is the button to close the MIOW$^+$-program.


Add a new company to the Main window, or add a new environmental measure to the window 'Environmental Measures'.


Add or edit data on the current window. A click on this button enables the user to change data.


Save changed data. On the main window this is the button to activate the Back-Up window.


Undo the changes just made.


Delete the selected company on the Main window or delete the selected environmental measure on the window 'Environmental Measures'.


Go to first window. On the Main window: select the first company. On the other windows: activate the window General Company Information.


Go to the previous window. On the Main window: select the preceding company.


Go to the next window. On the Main window: select the next company.

	Go to the last window. On the Main window: select the last company. On the other windows: select the window ‘Effects of environmental measures’.
	Print.

Closing MIOW+

The program is closed by clicking on the Close button in the Main window.

Adding a company

Click on button  in the Main window. The window ‘General Company Information’ appears and the general data about this company can be entered. Click on  to save the data or on  to return to the Main window without saving the data.

Fill in the first field on the screen, ‘Firm_id’. This is the shortened name of the company, which will be used to identify it.

Changing company data

Click on the button  in the Main window. The window ‘General Company Information’ appears and the general data about this company can be edited.

The questionnaire is split into several windows. There is a standard procedure for changing existing data or adding new data: after a click on  data can be changed or added. Use  to save changes and  to undo them.

The relations between the various windows are represented in figure 2.1. The arrows indicate how the user may browse from window to window, using the following buttons:  ,  ,  ,  and  (see ‘Explanation of icons’). You can see all the windows by just pressing <Enter> several times starting in the Main window.

The window “Internal indicators” demands further explanation. From the general information window and from the Competition window the user can jump to the first year of the Internal indicators using  and  , respectively. From this window the user can jump to the following three years for the internal indicators by using  . In the last window the user can jump to the Competition window, using  .

The window ‘Environmental Measures’ consists of some gross calculated figures and a list of environmental measures. To the right of this list there are three buttons to edit the list. By selecting (clicking on) an environmental measure and then clicking  , the window ‘Environmental measure’ appears, filled with the data for the selected measure. The data for the measure can be changed and then saved (using ) or be undone (). Using the button  copies the data of a selected measure to a new measure, which can then be edited in the way explained above.

The window Environmental Measures also contains a table with investments for the coming five years. The user only needs to fill in the first column: Total investments (including environmental investments). The other columns are calculated by the program, using the information supplied by the user.

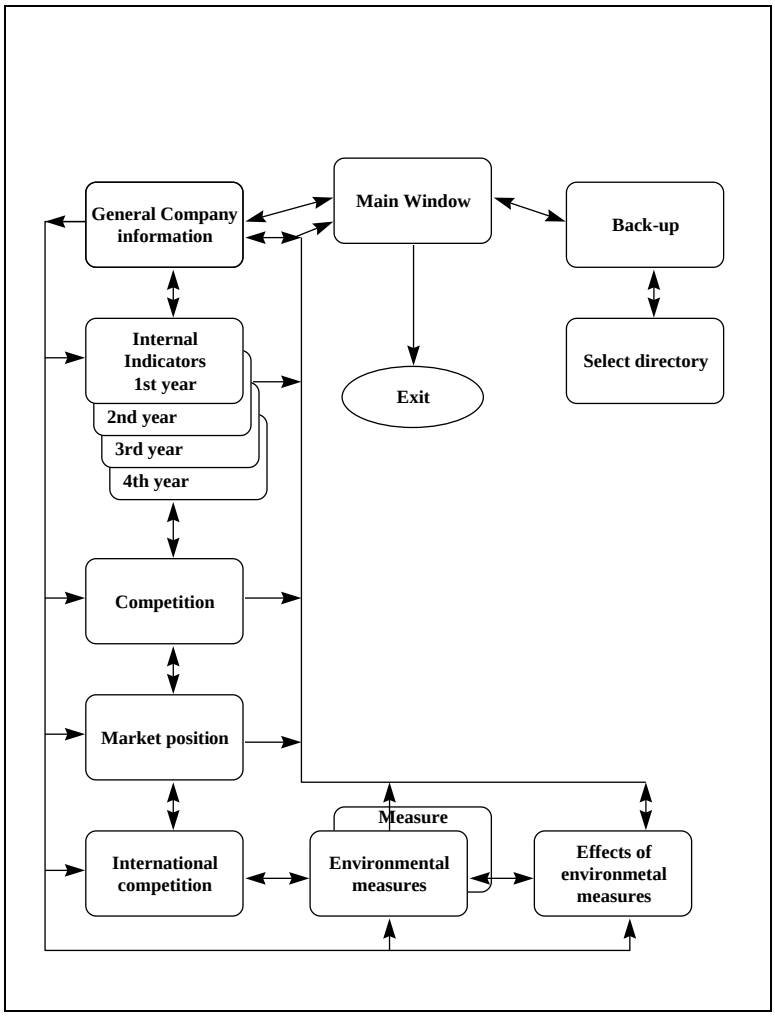


Figure 2.1 Relation between the computer windows

Note: An arrow from one window to another indicates that the user can jump from the first window to the second with just one click on a button.

Printing Questionnaire

A report of the current MIOW^{+}-session can be performed by clicking on the button . The report window appears. The user can then choose between printing a single report or all reports with the results for the program. It should be noted that the printing of more than one report is treated as a series of individual print jobs. In a network setting the user may therefore be asked to confirm the print job five times.

The user can also choose to save the reports in text files (ASCII-text). In this way, it is possible to insert the reports in a wordprocessor, like Word or WordPerfect.

Sensitivity Analysis

The windows ‘Environmental Measures’ and ‘Effects of environmental measures’ contain some possibilities for doing a sensitivity analysis. In the ‘Effects of environmental measures’ window the base year for the calculations can be varied. Moreover, the cost transfer percentage can be varied. The calculated fields in the window ‘Effects of environmental measures’ immediately adapt to the changes.

In the window ‘Environmental Measures’ the user can exclude certain environmental measures from the analysis by changing the starting year of the measure. Changing the starting year of a selected measure to 0 in the window ‘Measure’ excludes the measure from the analysis (this can be easily verified by looking at the column ‘Environmental Investments’). Changing the starting year back to any year within five years from the base year of analysis results in including the measure in the analysis. Excluded measures are indicated in the list of environmental measures in brackets.

Making or reading a Back-up

It is recommended to make a back-up of programs and data. Within MIOW$^+$ it is possible to make a back-up of the data within the program. The back-up copy of the program can be put on a disk or in any directory of either the hard disk or a network drive.

Making a back-up is not only sensible form a security point of view. It also makes it possible to exchange company data, for example between companies and government.

To make a back-up on a disk:

1. click on the button  on the Main window. The Back-Up window appears.
2. put a disk in drive a: (or b:, if available)
3. click on ‘Make Back-up’.

A window appears in which the user can choose the drive and directory for the back-up. Default drive a: has already been chosen; click on ‘Select’. All relevant files are now automatically copied to the selected directory. If this directory already contains MIOW$^+$-files, the old files will be overwritten.

To read a back-up from a disk:

1. click on the button  on the Main window. The Back-Up window appears.
2. put a disk in drive a: (or b:, if available)
3. click on ‘Read Back-up’.

A window appears in which the user can choose the drive and directory for the back-up. Default drive a: has already been chosen; click on ‘Select’.All relevant files are now automatically copied from the selected directory. If the back-up contains companies that already exist in the current MIOW$^+$-session, these are overwritten with the data from the back-up. Back-up data that do not have an equivalent Firm in the program directory are added to it.

3. Internal indicators

This chapter clarifies the windows "INTERNAL INDICATORS" and questions 1 to 5 of the questionnaire.

Internal indicators are important input data for MIOW$^+$. They determine, after scoring and weighting, the score for Resilience without extra environmental costs. The score for Resilience indicates to what extent company continuity is guaranteed. In chapters 1 and 7 the conclusions that MIOW$^+$ draws from a certain score for W are discussed. This chapter describes which input data are needed to calculate the internal indicators and, indirectly, the Resilience. After a number of general notes the eight indicators that are used in MIOW$^+$ will be described one by one.

Ratio analysis

MIOW$^+$ uses the ratio method known from financial literature. A ratio shows the proportion of one entry in the annual financial accounts of the company versus another. A financial analysis of the annual accounts is carried out easily using the ratio method.

Ratios are mostly used to analyse the liquidity, solvency and rentability of a company. Private companies are expected to aim for retention or extension of equity capital (solvency). To this end profit (rentability) is necessary, while sufficient liquid assets (liquidity) are a precondition in the short run. Based on the continuity principle the financial requirements limit the possibilities to implement cost price raising measures. Apart from liquidity, solvency and rentability other ratios also exist. MIOW$^+$ also takes into account activity ratios to gain insight into the efficiency of the use of means in the company.

MIOW$^+$ uses the following eight ratios as internal indicators:

Liquidity	1. Quick ratio
	2. Current ratio
Solvency	3. Solvency
	4. Interest coverage
Rentability	5. Return on total assets (ROA)
	6. Profit margin
Activity	7. Turnover on assets
	8. Capital intensity

These indicators are based on the company's annual account. To be able to calculate these indicators MIOW$^+$ requires a simplified balance sheet and income statement for four years. For each requested year the computer program automatically calculates the eight indicators and shows the results on the computer screen. On the same screen the score for individual indicators and the score for Resilience automatically appears. As explained in chapter 1, scores may range from 1 "very bad" to 5 "very good".

Indicators for four years

MIOW$^+$ asks for the annual accounts for the last four years, the reason being that financial data for one single year could easily give a wrong impression. A single year literally represents a single moment in time. Generally speaking data will vary from year to year, caused by structural as well as cyclical factors. Structural factors are trends over time, which may be positive (improvement) or negative (deterioration). Signs of cyclical factors are relatively good or bad years compared to a certain average.

By calculating the scores of the individual indicators as well as the Resilience over four years it is possible to get an impression of trends and cyclical influences. In table 1 of the company report (see Appendix 2) these are represented. Interpretation of these results is the task of an expert user. Based on his judgement he will be able to determine which year to choose as base year for the MIOW$^+$-calculations (see chapter 8). As a default MIOW$^+$ chooses the most recent year as base year.

Resilience determination

In MIOW$^+$ the score for Resilience is calculated as the weighted average of the scores for the individual indicators. This automated procedure goes as follows:

1. The short-term Resilience is based on the two indicators for liquidity;
2. The long-term Resilience is based on the other six indicators.

In the short run the liquidity of the company can be endangered if the investments are unfavourably financed. In the long run the liquidity will be reasonably constant and the expectations of the company will mainly be determined by rentability and solvency. In reality liquidity will function more as a restriction in the short run than as a determining factor in the long run. MIOW$^+$ presents short term and long-term Resilience next to each other and does not give a priority to either one. Below, if Resilience is mentioned without time specification, long-term Resilience is being referred to.

Technically speaking the different indicators have a different impact on the score for Resilience. For short-term Resilience the influence of the Quick ratio (67%) is twice as high as that of the Current ratio (33%). For long-term Resilience rentability has the largest influence, followed by activity and solvency. The score for Resilience is determined by solvency (11%), interest coverage (6%), ROA (33%), profit margin (17%), turnover on assets (22%) and capital intensity (11%).

Completing the financial accounts

The completion of the financial accounts is not expected to cause any major problems. Most data can be directly taken from existing annual reports. It goes without saying that it is strongly recommended to use data that have an audit certificate.

Clarification of some issues involved:

1. The financial data should be of the same level as the company activities at which the environmental measures are taken. Most of the time this will be a firm location or product installation. Finance is not always set up for this level of detail. More specifically, the balance statement and finance of capital (interest revenues and costs) are often only available at overall concern level. If this is the case, it is suggested to assign these data to the activities, based on shares in

total sales. Hence, if the activities concerned account for 40% of company income, then the balance sheet can be completed using 40% of the balance sheet for the whole company.

2. It is of great importance that the same value assessment methods be used for all four years. If this is not the case, major errors may be made in interpreting the results. If a major change occurs in the value assessment methods, the user should adapt the historical years to obtain continuity.

Clarification of the eight individual indicators

The critical boundaries are fit to analyse middle-large and large industrial companies, as mentioned in chapter 1. Using MIOW$^+$ for other companies involves looking at the results critically. In MIOW$^+$ the critical boundaries are fixed. The computer program calculates both the indicator values and scores automatically.

Liquidity

1. Quick ratio = (accounts receivable + securities + liquid assets)/ short-term debt
2. Current ratio = (stocks + accounts receivable + securities + liquid assets)/ short-term debt

Table 3.1. Critical boundaries liquidity indicators.

Score	1. Quick ratio value	2. Current ratio value
1	< 0.5	< 0.9
2	0.5 - 0.67	0.9 - 1.1
3	0.67 - 0.83	1.1 - 1.5
4	0.83 - 1	1.5 - 2
5	> 1	> 2

Example: A Quick ratio of 0.9 leads to a score "4"=good. A Current ratio of 1 leads to a score "2"=bad. In this way the score for all eight internal indicators is determined automatically within MIOW$^+$ (taking different critical boundaries per indicator).

Liquidity stands for the extent to which a company is able to meet its short-term obligations. In practice, this short term is equal to one year. The difference between the Quick ratio and the Current ratio is that the latter takes stocks into account, while and the former does not. Hence, the Current ratio is more sensitive to the value assessment methods used to determine the value of the stocks. This is the reason that the influence of the Current ratio is less than that of the Quick ratio.

Solvency

3. Solvency = equity capital / total liabilities
4. Interest coverage = operating profit / financial costs

Table 3.2. Critical boundaries Solvency indicators.

Score	3. Solvency value	4. Interest coverage value
1	< 20%	< 2
2	20 - 25%	2 - 3
3	25 - 35%	3 - 4
4	35 - 45%	4 - 5
5	> 45%	> 5

Solvency stands for the ability of the company to fulfil its obligations in the long term. In practice, this long term is equal to more than one year. Solvency answers the question how well the creditors are protected in case of insolvency. The higher the Solvency, the greater the possibilities of a company to obtain additional funding (credit space).

The Interest coverage indicates to what extent the company can fulfil its interest obligations. The higher the Interest coverage, the easier it is to obtain additional credits.

Rentability

5. ROA = operating profit / total assets

6. Profit margin = operating profit / net sales

Table 3.3. Critical boundaries rentability indicators.

Score	5. ROA value	6. Profit margin value
1	< 5%	< 4%
2	5 - 8%	4 - 7%
3	8 - 11%	7 - 10%
4	11 - 14%	10 - 13%
5	> 14%	> 13%

Rentability stands for the ability of a company to use the invested funds profitably. A positive operating profit is necessary for the continuity of the company.

The ROA (return on assets) links profits to total assets; the Profit margin links profit to sales. ROA is the most widely used indicator to assess operating units.

Activity

7. Turnover on assets = net sales / total assets

8. Capital intensity = tangible fixed assets / net sales

Table 3.4. Critical boundaries activity indicators.

Score	7. Turnover value	8. Capital intensity value
1	< 0.8	> 0.67
2	0.8 - 1	0.40 - 0.67
3	1 - 1.2	0.28 - 0.40
4	1.2 - 1.4	0.22 - 0.28
5	> 1.4	< 0.22

Activity indicators stand for the efficiency of the use of company means. These indicators are primarily fit to measure the performance of production units. Of the Activity indicators the turnover on assets is the most widely used. The higher the turnover, the larger the Return on assets (ROA) is given the value of the Profit margin.

The Capital intensity indicates the company's vulnerability to cyclical influences. A company with a high Capital intensity is relatively vulnerable.

4. External indicators

This chapter a clarifies the windows 'Competition' and 'Market position' and questions 6 to 20 of the questionnaire.

The external indicators are the second major source of information for MIOW$^+$. They determine, after scoring and weighing, the score for Market Situation. This score determines to what extent the (additional) environmental costs can be transferred to company clients. Chapters 1 and 7 discuss the consequences that MIOW$^+$ derives from a score for Market Situation. This chapter describes what input data are needed to calculate the indicators and Market Situation.

Relevant market

When completing the fields for the external indicators the user should keep in mind that the data needed are those for the relevant market for the individual company (or plant). What the relevant market is, will differ greatly from company to company.

The user of MIOW$^+$ has to define the company's relevant market The following crude classification may be used for industrial companies:

1. *National markets*
   Relevant for subcontractors (e.g. galvanising) and medium-sized product industries (metal construction, printing).
2. *Supra-national regional markets*
   Relevant for product industries (metal products, plastics) and food products.
3. *World markets*
   Relevant for industries producing bulk goods (bulk chemicals, basic metals).

It should be emphasised that this classification is just an aid for filling out in the questionnaire. Every company should decide what in its case is the best definition, depending on, amongst others, market and technical factors of influence. The more international the market is, the more relevant the differences in environmental costs between competitors may be. These environmental costs will be discussed in chapter 5.

Determining the Market Situation

To determine the Market Situation (M), MIOW$^+$ uses two kinds of information:

1. the Competition score; and
2. the Market position.

The *Competition score* is made up of five indicators, which are in turn based on 11 basic figures. These basic figures come from questions 6 to 16:

Power of suppliers

1. Number of suppliers (Suppliers)
2. Alternative suppliers (Alternat.sup.)
3. Costs to change to alternative suppliers (Costs. alt. sup.)

Power of clients

4. Number of clients (Clients)
5. Percentage of sales to biggest 4 clients (Big 4 clients)

Potential competition

6. Number of substitute products (Substitutes)
7. Costs to change to substitute products (Costs subst.)

Threat of new entries

8. Number of entrants in last 5 years (Entry past)
9. Number of entrants in next 5 years (Entry future)
10. Problems caused by new entries (Entry problems)

Market concentration

11. Percentage of sales by biggest 4 suppliers (Big 4 sup.)
12. Own company among biggest 4 suppliers (Among big 4 sup.)

The Competition score is calculated stepwise. In the first step the external indicators are calculated as an unweighted average of the relevant basic figures. For example, the score for 'Power of suppliers' is determined by dividing the sum of the scores for 'Number of suppliers', 'Alternative suppliers' and 'Costs to change to alternative suppliers' by 3.

In the second step the five external indicators are combined to get the score for the Competitive position (as an unweighted average).

The *Market position* is based on questions 17 and 18. For both the period 1993-1997 and the period 1998-2001 the following indicators are calculated form the completed tables:

a. own annual percentage change in sales; and
b. annual percentage change in market share of the company.

After determining the scores these four figures (two for the period 1993-1997 and two for the period 1998-2001) are combined to get the score for Market position (as an unweighted average).

Market Situation is determined as the unweighted average of the final scores for 'Competition score' and 'Market position', by adding up both scores and then dividing by 2. This procedure is clarified in tables 2 and 3 of the company report in Appendix 2. It should be noted that the calculation of the external indicators, the final scores and Market Situation is completely automated within MIOW^{+}. The user only needs to provide the basic figures.

Completing 'Competition score'

This section specifically discusses the window 'Competition score' and questions 6 to 16.

The analysis of the competitive position is based on a model made by the American economist Porter. Porter states that the market circumstances determine to a large extent whether or not a company can function profitably. The five competition powers that he distinguishes (Power of suppliers, Power of clients, threat of substitutes, threat of new entries, degree of concentration in

the sector) form the base for the external indicators in MIOW$^+$. Please note that, with the exception of 'Power of suppliers', all indicators are directed at the company's sales market. This is obvious, as the fundamental base of any company is to operate profitably on its relevant sales market.

Completing the relevant basic figures demands a significant effort by the user. First, he or she has to decide upon the market that is relevant to the company. Then, using the definition of the relevant market, the user has to complete questions 6 to 16 as accurately as possible.

Answers to questions 6 to 16 will come from different sources. The purchasing department will be able to give the most information on the Power of suppliers (questions 6, 7 and 8). The sales and marketing departments will probably be the most useful source of information on the other questions (9 to 16). The financial department can provide information on the number of suppliers and clients (questions 6, 9 and 10). For some questions the user may need to look into market explorations and sectoral reports for information (questions 7, 8, 11 to 16). The availability of such reports will differ from sector to sector. If necessary, the company will have to give its own estimations.

Various questions are asked as extra information. For example, question 6b asks for the absolute number of suppliers. If the user completes this question as accurately as possible, the main question 6a can be completed with more ease and accuracy. The same applies to questions 7b, 8b, 9b, 11b and 13b (see Appendix 1): these numerical questions are not directly used within the computer program for calculations, but the precise figures will increase the accuracy of the interpretation.

By answering the various questions, a score for these questions is automatically given.

Power of suppliers (questions 6 - 8)

The Power of suppliers is determined by the degree of concentration of suppliers and the possibilities to change to alternative suppliers. Suppliers have relatively much power over a company if there are few suppliers and the possibilities to change to an alternative supplier are few (few alternatives, high costs).

Questions 6a, 7a and 8a are divided into four categories of suppliers: raw materials, auxiliary materials, machines and other. Using the shares of these inputs in total purchases (question 8c) as weights, the computer program calculates the weighted average scores of these questions.

Power of clients (questions 9 - 10)

The Power of clients is primarily determined by the degree of client concentration. If the number of clients is limited, the company is highly dependant on these clients. They will have a large influence on the price, quality, etcetera, and hence indirectly on the company's rentability.

The answer to question 10 should be available from the financial records.

Potential competition (questions 11 - 12)

For most products there is at least one substitute product available. Substitute products are those products that can fulfil the same function for the client. As more substitutes are available chances that a client will switch to a substitute product increase. A threshold, however, may be the costs involved with switching to substitute products.

The nature of the substitutes is closely connected to the relevant market of both the company itself and its clients. For a nationally operating company foreign substitutes are not very relevant. Furthermore, it is important to look at the alternatives for the company's current clients. This again stresses the importance of the relevant market.

Threat of new entries (questions 13 - 15)

This indicator describes the extent to which other companies may enter the market. The easier this is, the more the chance of competition will increase. There are several barriers to new entry, and they differ greatly between markets. This is why MIOW$^+$ asks for company-specific general experiences and expectations.

Market concentration (question 16)

The degree of concentration within a sector largely determines the competition between companies. In general, a higher degree of concentration will lead to less competition, especially for the dominant companies in the market. If the company under analysis is among the four largest suppliers, a high degree of concentration will lead to a high score for Market concentration. For smaller companies (not belonging to the main four) competition is relatively hard in a highly concentrated market. Hence, for small companies the computer program translates a high degree of concentration into a low score for the indicator.

In extreme situations it may be possible that there are fewer than four companies on the market. If the company is a small actor on this market, the answer to question 16b should be "no", to indicate the small market power.

Completing Market position

This section specifically discusses the window 'Market position' and questions 17 to 20.

The analysis of the Market position is based on a method of the Boston Consulting Group in the United States. Their so-called 'portfolio approach' highlights the position of the company in its market. To this end the relative market share and market growth are used.

The historical sales of the company (question 17) is already known from questions 1 to 4; these figures should also be entered here, however. All other data require an effort of the sales and marketing departments and, if there is one, the strategic planning department. They can use several sources of information. The optimal source is the strategic company plan. Furthermore, it is possible to extrapolate trends in company sales to the future. Sectoral reports are often a good source to determine the size of the whole relevant market. This also applies to future market expectations.

All questions are concerned with the Market position without the additional environmental costs, except one: question 18b asks for the expected sales WITH additional environmental costs. Question 18b is asked as a check on the own company's estimation of the consequences of the additional environmental costs.

There are hardly any reliable methods to predict breaks in economic trends. Hence, normally the expectations for the future are based on past experiences. This will also be the case for the completion of the questionnaire. It is recommended to explicitly consider the possibilities of structural changes in the Market Situation. Of course, an expected structural change should be properly substantiated.

Table 4.1. Critical boundaries for Market position (annual percentage).

Score	Market growth	Change in market share
1	< -3	< -10
2	-3 - -1	-10 - - 5
3	-1 - +1	- 5 - + 5
4	1 - 3	5 - 10
5	> 3	> 10

The development of the sector, market growth, is an important variable in determining the possible consequences of environmental measures. If demand goes down, competition will become harder and the possibilities to transfer the additional costs to clients will diminish. On the other hand, in a growing market most of the time it is fairly easy to transfer (part of) the additional costs. Interpretation of a change in the company's market share is self-evident. A decreasing market share indicates a weak Market position with few possibilities to manoeuvre, an increasing market share indicates a strong Market position with more possibilities.

Particularly for the questions on future expectations it is hard to estimate absolute numbers. Therefore, it is also possible to enter indices, where total market size in the base year is set at 100. This procedure is used in questions 19 and 20.

Many companies and product locations supply more than one product. MIOW^{+} does not have any possibilities to distinguish between the various output products. The user will have to give the predicted developments for the whole group of products. Often it will be possible to concentrate on one or two main products or product categories.

5. International competition

This chapter clarifies the window 'International Competition' and questions 21 to 25 of the questionnaire.

International environmental policies are not equal, and this may have consequences for those companies that sell a large share of their products on international markets. Hence it is interesting to look at the extent to which companies have to compete with foreign producers who are confronted with less strict environmental policies.

For the description of the international competition an approach is chosen that is less quantitative than the description of the internal Resilience and Market position. The descriptive, qualitative approach gives a good picture of the idea that international competition may be of high importance to the company, but that its importance is indirect and already an (implicit) part of the external indicators. The external indicators, as discussed in chapter 4, are explicitly meant to cover the whole relevant market, including the relevant international market.

To get an insight into the international context of the company the section on International competition contains six questions, which are discussed in this chapter. The information required should be available from the sales and marketing departments (questions 21, 24 and 25) and environmental department (questions 22 and 23). As the completion of these questions is relatively straightforward, the questions will only be discussed briefly below. The chapter concludes with a section on the way the international competition is taken into account in the quantitative part of the computer model.

Determining international competition

The first question (21) aims at envisaging the (geographical spread of) the international market by listing the countries in which the major competitors are located. The list does not have to be complete; only the major countries are important.

Question 22 determines to what extent foreign competitors can get a competitive advantage from lower environmental costs in their countries. The question is split into two parts: firstly, an estimation of the number of competitors that are confronted with less strict environmental policies is asked for. Secondly, a description of the main aspects of these less strict policies is asked for. Although the categories are necessarily broad, the user can get some insight into the main problems on the international market caused by the environmental measures.

The degree to which the environmental measures are a problem on the international market is partially determined by the number of competitors that are confronted with less strict environmental policies, but also by the size of these competitors. Question 23 is concerned with the total market share of foreign competitors that are confronted with less strict environmental policies. The combination of questions 22a and 23 gives an insight into the degree to which the international market is dominated by competitors that are confronted with less strict environmental policies than the company.

In addition to these figures, which indicate how large the problems on the international market may be, it is of course important to know what percentage of your total sales are made on foreign markets (question 24). This export share is often used as an indicator of the globalisation of the company. This indicator should, however, be interpreted with caution, as it does not always give a

good insight into the international competition. Hence, MIOW$^+$ only uses the export share as a qualitative indicator and not for the calculation of the quantitative results.

The questions on international competition end with question 25, which, analogous to question 21, lists the most important outlet countries for the company's sales. Again, this list does not have to be complete, but the major countries in the relevant market should be mentioned.

Influence of international competition on the costtransfer percentage

First it is important to note that the report on international competition leaves room to specify company-specific characteristics. From analysis of questions 21 to 25 a general description of the company's international competition can be derived. This general description may, depending on the results, place an upper bound on the possibilities to transfer the additional environmental costs to clients: if the international market is of high importance to the company and many foreign competitors are confronted with less strict environmental policies, then the international competition does not leave much room to transfer the costs to clients. The costtransfer percentage, as calculated from the Market position and more precisely from the score for M, can then be decreased to account for this.

In practice, the costtransfer percentage in the computer model will be set at 0% if the answer to question 23 results in a score of 5 (more than 80%). If question 23 results in a score of 4 (60% - 80%), then an upper bound of 25% is placed on the costtransfer percentage.

6. Environmental measures

This chapter clarifies the window 'Environmental measures' and questions 26 to 28 of the questionnaire.

The environmental measures, and with them the environmental investments and annual environmental costs, play a central role in the MIOW$^+$-method. This chapter is devoted to the calculation of the annual environmental costs and gives an indication of their relative size. The annual environmental costs that stem from the environmental measures that the company is confronted with, consists of two parts:

1. Environmental investments (questions 26 and 27); and
2. Change in operating costs and income (question 28).

Definition of environmental costs

In the MIOW$^+$-model the definition of environmental costs is based upon a Dutch policy report, called 'Methodiek Milieukosten' (Methodology for environmental costs), made by Statistics Netherlands (CBS), the Central Planning Bureau (CPB), the Ministry of Environment (VROM) and the National Institute for Public Health and Environment (RIVM). See VROM (1994).

Environmental investments

The user has to make an inventory of all the environmental investments that will confront the company in the next five years. These environmental investments can be compared to the total investments in the same years to get an idea of the relative size of the environmental investments (total investments are covered by question 26 of the questionnaire; the environmental investments are calculated by the program as the sum of the investments of all environmental measures listed). Furthermore, it is possible to compare average investments over the period 1997-2001 with annual depreciation over the period 1994-1997, as given in the financial accounts in questions 1 to 4.

Question 27 is asked to obtain insight into which environmental aspects are the prime objective of the environmental measures. This can be compared to the environmental aspects of the environmental measures that foreign competitors are confronted with.

Individual environmental measures can be listed in the program. In question 28, for each measure the user has to provide the data for the year of implementation, the amount of investments involved and the additional annual operating costs and income caused by the measure. A name and description may be added to each measure. The computer program calculates the annual costs that represent the investments and the total annual costs of the measure.

To be able to determine the annual depreciation of the environmental investments, question 28 also asks for the nature of these investments: construction, electro-mechanical or other. For construction-oriented investments MIOW$^+$ assumes a depreciation period of 25 years, based on standard financial literature. For electro-mechanical and other investments, a depreciation period of 10 years is assumed. Based on these depreciation periods, the annual capital costs, equal to an annual fixed amount for depreciation and interest costs, is calculated. In the MIOW$^+$ model this calculation of the capital costs is automatically done for the next five years. For example, from an

investment that is planned in 1998 the annual capital costs that will be part of the total environmental costs from 1998 onwards, are calculated.

Change in operating costs and income

The operating costs and income (part of question 28) may change as a consequence of the planned environmental measures, irrespective of whether a significant investment is concerned with the measure. Examples are separated waste disposal and good housekeeping.

It is important to note that the additional operating costs do not concern interest or depreciation costs, but direct costs such as additional labour costs, maintenance and use of energy and materials. The additional operating costs and income should be based on annual figures. The MIOW$^+$-program automatically adds up the additional operating costs and income over the years.

Calculation of the total annual environmental costs

By calculating the annual capital costs, adding the additional operating costs and subtracting the additional income, the computer program determines the total annual environmental costs as:

- Total annual costs = annual capital costs + additional annual operating costs - additional annual income

If the additional annual income is sufficiently high to make the total annual environmental costs negative, then the definition of environmental costs states that the costs of the measure are not environmental costs (see VROM, 1994). Within MIOW$^+$ such a measure is, however, taken into account and treated like the other environmental measures.

Next to the total annual environmental costs the program also gives three indicators that shed some light on the relative size of the environmental costs: the total annual environmental costs are expressed as a percentage of total sales, value added and operating profits in the base year (in the current model version 1997). Value added is calculated as depreciation plus labour costs plus operating profits.

7. Standard effects of environmental measures

This chapter clarifies the window 'Effects of environmental measures'.

Now that all data have been entered into the model the standard effects of the environmental measures on the internal Resilience can be determined. The program automatically computes this.

From the score for Market position, perhaps adapted by the score for International competition, the model calculates a standard costtransfer percentage. This percentage indicates to what extent the company can transfer the environmental costs to its clients. The remaining environmental costs (net environmental costs) have an impact on the financial company's accounts. The computer program determines this impact for the base year financial accounts (normally, the most recent available year).

The environmental investments and annual environmental costs have an impact on several figures in the financial accounts. It is practically impossible to take all impacts into account; still, some assumptions have to be made on the precise impacts of the environmental costs (for example on the way of financing of the measures, the extent of crowding out other investments, etcetera). In MIOW$^+$ the following impacts are taken into account:

1. the tangible fixed assets increase with the amount of the total environmental investments over the period 1997-2001;
2. the long-term debt increases with the amount of the total environmental investments over the period 1997-2001;
3. total operating costs increase with the amount of the total annual environmental costs in 2001.

From these changes in the financial accounts follow new scores for the internal indicators and hence a new score for the internal Resilience (see chapter 3 for a discussion of the internal indicators and Resilience). The resulting score for internal Resilience can again be classified as being in the 'green' zone ("safe"), 'orange' zone ("uncertain") and 'red' zone ("unsafe").

The score and class of internal Resilience *including the environmental measures* can be compared to internal Resilience *excluding the environmental measures*. This gives an insight into the influence of the environmental measures on the continuity of the company.

8. Interpretation of the results and calculation of variants

In chapters 3 to 7 the standard procedure of MIOW$^+$ is discussed. After completing the questionnaire the computer program calculates the score for internal Resilience, excluding and including the environmental measures, based on fixed critical boundaries and weighing factors.

It is important to investigate closely all data and model results, in MIOW$^+$ as well as in other models. In this chapter the user will find some tips and hints for the interpretation of the (standard) results. If the user is unhappy with certain results due to specific circumstances, MIOW$^+$ provides some possibilities to calculate variants and do a sensitivity analysis. This concludes the MIOW$^+$ manual.

Interpretation of internal Resilience

Table 1 of the company report gives an overview of the development of the internal indicators and internal Resilience (see Appendix 2). The user can do the following analysis, amongst others:

- The search for *trends*. Trends can be either positive (persistent increase), negative (persistent decrease) or constant (unchanged level). It is recommended to first look for trends in Resilience, followed by an analysis of trends in the indicators. Given the high weighing factors for the rentability indicators (ROA and Profit margin), any trends in these indicators will probably have an impact on Resilience. Trends provide a source for prediction of future developments. Given the structural uncertainty concerning future developments, the user has to be careful with this kind of predictions.
- The search for *cyclical influences*. Most companies have some cycles of good and bad years of business. For the whole economy these cycles are relatively clear: for example, 1990 and 1991 were successful years for most Dutch companies, while 1993 was a relatively less successful year 1994 to 1997 were successful once more. For individual companies these developments may be equally clear, but this is not necessarily the case. Both trends and specific market factors can dominate cyclical influences.

  An indication for a cycle is an alternating increase and decrease in the score for internal Resilience. If this is the case, it is useful to look at the individual indicators for underlying factors of influence. The cyclical influences are primarily important when choosing the base year for the calculations (see Sensitivity analysis). When cyclical influences are clear it is recommended to choose the base year with care and avoid choosing an extreme year.
- The search for *extreme values*. Internal Resilience is a weighted average of eight indicators. This means that behind a relatively good score for Resilience some individual indicators may still have a low score (and vice versa). It is useful to analyse the results for those indicators that structurally have an extreme value (both extremely high and low). This analysis provides the user with a (limited) analysis of strong and weak factors. Extreme values will in most cases have only a minor (or even no) effect on the central results of MIOW$^+$. Naturally, a sensitivity analysis using other entry data is always possible.

Interpretation Market Situation

Tables 2 and 3 of the company report give an overview of the Market Situation (see Appendix 2). The user can do the following analysis, amongst others:

- The search for *trends*. This analysis is concerned with dominant scores and the question whether the scores for competition and Market position are close to each other or not. If all scores are relatively close to each other this indicates a coherent Market Situation.
- The search for *cyclical influences*. Practically only observable for market growth and market share in the past years.. If cycles can be deduced from these indicators, it is recommended to compare cycles in the Market Situation with the cycles in the internal indicators.
- The search for *extreme values*. Both the Competition score and the Market position score can be made up of varying indicators. The user is advised to look for extreme values and strengths and weaknesses. Extreme values will in most cases have only a minor (or even no) effect on the central results of MIOW$^+$. Again, the user can do a sensitivity analysis.

Interpretation of environmental costs

As with all predicted future figures, the size of the environmental investments and costs is fundamentally uncertain. The estimation of the environmental costs will be the best available guess. If the predicted environmental costs are very uncertain, it is recommended to work with a band width by defying upper and lower bounds on the environmental costs and to run the computer program with both figures.

Sensitivity analysis

In some cases the user will not be satisfied with the standard results of MIOW$^+$. The user may then want to do a sensitivity analysis to examine the influence of certain input data on the results. Moreover, the user may want to use a different base year for the calculations to examine the influence of cycles on the results. The user should always justify why the standard results are not sufficient when doing additional calculations.

In principle all input data and base years can be varied. This requires an additional round of calculations. By comparing the results of the variant with the standard results the influence of the varied factors can be examined. The current version of the computer program of MIOW$^+$ cannot do multiple calculations within one session. Of course, the user can define a new session with the data of the sensitivity analysis and compare the two sessions.

This chapter discusses how three variants that are often mentioned can be calculated:

- variants for future sales;
- variants for environmental costs;
- alternative base year for calculations.

Variants for future sales

In question 18 the user is asked to predict the future sales of the company and total sales in the relevant market. By definition such a prediction is uncertain. In some cases, for example, the company will have scenarios for future sales available.

The sensitivity of the results for this prediction of future sales can be examined by entering a different prediction for future sales. The influence of this sensitivity analysis will be clearest for the possibilities to transfer the costs to clients. Indirectly, this will influence the score for internal Resilience.

Variants for environmental costs

In question 28 the user is asked to provide information on the expected environmental investments and annual costs. Even though it is expected that a concrete set of environmental measures is specified, the prediction of the associated costs is inherently uncertain. For example, the priority order of environmental measures may change over time, or the real costs may be higher or lower than expected. Hence, the user may want to calculate some variants for the environmental costs.

The sensitivity of the model results for the environmental costs can be examined by entering a different prediction of these costs in question 28. A variant often used is to double or halve the expected total environmental costs. The influence of the changed environmental costs will be the clearest in the change in the total annual environmental costs, which in turn influence the score for internal Resilience including environmental costs.

Variants for base year for calculations

Normally, MIOW$^+$ takes the most recent year (in the current version 1997) as the base year for the calculations of the influence of the environmental costs. This most recent year may, however, not be a representative year, for example due to the cyclical influences. Hence, the user may want to change the base year to a 'cyclical neutral' year.

The influence of the base year on the results can be examined by choosing a different base year in the window 'Effects of environmental measures'. The user can do this by clicking the year in the top righthand corner of the window and choosing another year. The computer program then automatically recalculates the influence of the environmental costs on the internal indicators and internal Resilience, based on the new base year.

Finally, it may be very tempting to analyse many variants in an interactive program such as MIOW$^+$. Doing many different runs may however be confusing for the interpretation of the results. Hence, the user should only calculate variants if the input data require this, and give a clear justification (and interpretation) of the chosen changes in input data.

Appendix 1. Questionnaire Miow+

(P.M. MIOW+ stands for 'Marktsituatie, Internationale Omgeving en Weerstandsvermogen' (in Dutch), whch can be translated as Market Situation, International competition and Resilience)

Developed by the Institute for Environmental Studies (IVM) and the Economic and Social Institute (ESI) of the Vrije Universiteit Amsterdam.

Questionnaire completed by:

Company	:	.....
Address / postal code	:	.....
PO box / postal code	:	.....
Residence	:	.....
Name of contact person	:	.....
Phone number of contact person	:	.....
Number of employees:	:	.....
Main Activity:	:	.....

To make further contact concerning this questionnaire easier, please keep a completed copy of the questionnaire.

A. Internal indicators

We kindly request that you provide some financial data about your company in the years 1994 - 1997, preferably with an audit certificate.

Clarification of financial definitions:

- Operating profits are defined as Earnings Before Interest and Taxes (EBIT).
- Other income includes stock variation, semi-manufacture and capitalised production for the benefit of the company.
- Total operating costs include depreciation, labour costs including pension contributions and other social security costs, costs of raw and auxiliary materials, costs of subcontracted work and other external costs.
- Financial revenues and costs encompass amongst others interest paid and received.
- All amounts in thousands.

Audit certificate

The information given under questions 1 to 4 has been verified by me and is approved to be correct.

Company	:	.....
Address / postal code	:	.....
PO box / postal code	:	.....
Residence	:	.....
Name of contact person	:	.....
Phone number of contact person	:	.....

Signature: : .....

Financial year: 1994

1a. Balance sheet by 31-12 (in thousands)

Tangible fixed assets	....	Equity capital	....
Intangible fixed assets	....	Provisions	....
Financial fixed assets	....	Long-term debt	....
Stock	....	Short-term debt	....
Accounts receivable	....		
Securities	....		
Liquid assets	....		
	____ +		____ +
Total assets	....	Total liabilities	....

1b. Income statement (in thousands)

Total operating income			....
incl.	*Net sales*	....	
	Other income	....	
Total operating costs			....
incl.	*Depreciation costs*	....	
	Labour costs	....	
			___ -
Operating profit			....
Financial revenues and costs			....
incl.	*Financial revenues*	....	
	Financial costs	....	
			___ -
Profit before taxes			....

Financial year: 1995

2a. Balance sheet by 31-12 (in thousands)

Tangible fixed assets	....	Equity capital	....
Intangible fixed assets	....	Provisions	....
Financial fixed assets	....	Long-term debt	....
Stock	....	Short-term debt	....
Accounts receivable	....		
Securities	....		
Liquid assets	....		
	____ +		____ +
Total assets	....	Total liabilities	....

2b. Income statement (in thousands)

Total operating income			....
incl.	*Net sales*	....	
	Other income	....	
Total operating costs			....
incl.	*Depreciation costs*	....	
	Labour costs	....	
			___ -
Operating profit			....
Financial revenues and costs			....
incl.	*Financial revenues*	....	
	Financial costs	....	
			___ -
Profit before taxes			....

Financial year: 1996

3a. Balance sheet by 31-12 (in thousands)

Tangible fixed assets	....	Equity capital	....
Intangible fixed assets	....	Provisions	....
Financial fixed assets	....	Long-term debt	....
Stock	....	Short-term debt	....
Accounts receivable	....		
Securities	....		
Liquid assets	....		
	____ +		____ +
Total assets	....	Total liabilities	....

3b. Income statement (in thousands)

Total operating income			....
incl.	*Net sales*	....	
	Other income	....	
Total operating costs			....
incl.	*Depreciation costs*	....	
	Labour costs	....	
			___ -
Operating profit			....
Financial revenues and costs			....
incl.	*Financial revenues*	....	
	Financial costs	....	
			___ -
Profit before taxes			....

Financial year: 1997

4a. Balance sheet by 31-12 (in thousands)

Tangible fixed assets	....	Equity capital	....
Intangible fixed assets	....	Provisions	....
Financial fixed assets	....	Long-term debt	....
Stock	....	Short-term debt	....
Accounts receivable	....		
Securities	....		
Liquid assets	....		
	____ +		____ +
Total assets	....	Total liabilities	....

4b. Income statement (in thousands)

Total operating income			....
incl.	*Net sales*	....	
	Other income	....	
Total operating costs			....
incl.	*Depreciation costs*	....	
	Labour costs	....	
			___ -
Operating profit			....
Financial revenues and costs			....
incl.	*Financial revenues*	....	
	Financial costs	....	
			___ -
Profit before taxes			....

5. How high do you estimate the profit before taxes?

Very low	1
Moderately low	2
Average	3
Moderately high	4
Very high	5

B. External indicators

We request that you answer a number of questions about the current Market Situation and your expectations for the next four years. Please circle your choice and for the other questions give the required numbers.

Competition score

Power of suppliers

6a. What is the number of suppliers to your company?

Kind of supplier	raw material	aux. material	machines	other
Very low	1	1	1	1
Moderately low	2	2	2	2
Average	3	3	3	3
Moderately high	4	4	4	4
Very high	5	5	5	5

6b. Please indicate this in absolute numbers

Raw materials suppliers	.....
Auxiliary materials suppliers	.....
Machine suppliers	.....
Other suppliers	.....

7a. Are there alternative suppliers available if one of your suppliers fails to supply?

Kind of supplier	raw material	aux. material	machines	other
Very low	1	1	1	1
Moderately low	2	2	2	2
Average	3	3	3	3
Moderately high	4	4	4	4
Very high	5	5	5	5

7b. Please indicate this in absolute numbers

Raw materials suppliers	.....
Auxiliary materials suppliers	.....
Machine suppliers	.....
Other suppliers	.....

8a. What would be the costs to change to another supplier?

Kind of supplier	raw material	aux. material	machines	other
Very low	1	1	1	1
Moderately low	2	2	2	2
Average	3	3	3	3
Moderately high	4	4	4	4
Very high	5	5	5	5

8b. How big would be the expected increase in costs when changing to other suppliers?

.....%

8c. Could you give the share of purchase value of

Raw materials suppliers	.....%
Auxiliary materials suppliers	.....%
Machine suppliers	.....%
Other suppliers	.....%

Power of clients

9a. How many clients has your company got?

Very low	1
Moderately low	2
Average	3
Moderately high	4
Very high	5

9b. Please indicate this in absolute numbers

Clients .....

10. What percentage of the sales of your company is sold to the 4 biggest clients?

over 80%	1
60% - 80%	2
40% - 60%	3
20% - 40%	4
0% - 20%	5

POTENTIAL COMPETITION

Threat of substitute products

(products that can fulfil the same function to the client)

11a. How many substitute products exist to the products your company offers?

Very high	1
Moderately high	2
Average	3
Moderately low	4
Very low	5

11b. Please indicate this in absolute numbers

number of substitute products .....

11c. Please indicate the nature of the substitute products

- different raw material
- different production process
- other, namely .....

12. How high are the costs for your clients to switch to substitute products?

Very low	1
Moderately low	2
Average	3
Moderately high	4
Very high	5

Threat of new entries

13a. How many companies have entered your market in the last 5 years?

Very high	1
Moderately high	2
Average	3
Moderately low	4
Very low	5

13b. Please indicate this in absolute numbers

number of new entries .....

14. How many new companies do you expect to enter your market in the next 5 years?

Very high	1
Moderately high	2
Average	3
Moderately low	4
Very low	5

15. To what extent do new entries cause problems for your company?

Very high	1
Moderately high	2
Average	3
Moderately low	4
Very low	5

Market concentration

16a. What percentage of sales in your market is reached by the 4 largest suppliers?

0% - 20%	1
20% - 40%	2
40% - 60%	3
60% - 80%	4
over 80%	5

16b. Do you consider your company to be one of the 4 largest suppliers?

yes	1
no	2

Market position

Market share

17. Please complete the following table by entering the sales your company made in the last 5 years and also the total sales in your market (all figures in thousands)

	Company	Total market
1993		
1994		
1995		
1996		
1997		

18a. Please complete the following table by entering the expected sales for the next 5 years, if NO extra environmental measures are imposed (all figures in thousands)

	Company	Total market
1996		
1997		
1998		
1999		
2000		
2001		

18b. Please enter the expected company sales 5 years from now, if extra environmental measures ARE imposed (all figures in thousands)

Sales 2001 . . . .

Clarification and explanation of tables 19 and 20.

Please complete table 19 by entering the share of your company in total products sold in your market in 1996 as well as the expected developments for 1997 to 2001 as compared to 1996.

Please complete table 20 in a similar way for the sales price of your product as compared to the average sales price in your market.

N.B. In these questions "sales" means the number of products sold in tonnes or thousands, etcetera.

19. Please complete the following table by entering the expected relative development for the number of products sold for the period until 2001, if NO extra environmental measures are imposed (all figures in thousands)

	Company	Total market
1996		100
1997		
2001		

20. Please complete the following table by entering the expected sales price of your products compared to the average sales price in your market for the period until 2001, if NO extra environmental measures are imposed (all figures in thousands)

	Company	Total market
1996		100
1997		
2001		

C. International Competition

Please complete a number of questions on the international competitive position of your company and the possible role of environmental costs therein.

21. From what countries do your main competitors originate?

.....

.....

.....

22a. Are your foreign competitors confronted with less strict environmental policies than domestic companies on your market?

1 yes, all foreign competitors

2 yes, most foreign competitors

3 yes, 50% of foreign competitors

4 yes, some foreign competitors

5 no

22b. If yes, for what environmental aspects are there less strict policies for foreign competitors?

- air
- water
- soil
- packing materials
- waste
- other, namely.....

23. What percentage of the total sales is made by foreign competitors with LESS strict environmental policies on your market?

0% - 20%	1
20% - 40%	2
40% - 60%	3
60% - 80%	4
over 80%	5

24. What percentage of total sales does your company sell abroad?

.....%

25. To which countries do you export your products?

.....

.....

.....

.....

D. Environmental measures

Please complete a number of questions on the expected environmental measures and total investments for the coming years.

26a. Please indicate the expected investments for your company for the coming years (all figures in thousands)

	Total investments
1997	
1998	
1999	
2000	
2001	

26b. Please indicate the average annual environmental investments for the years 1994-1997. If you wish, you may include a list of environmental measures, analogous to question 28 (all figures in thousands).

Environmental investments 1994-1997 (annual average) .....

27. At which environmental aspects are the environmental measures for the coming years mostly aimed? If possible, please indicate the environmental aspect aimed at for each environmental measure with the general description of the measures in question 28 (all figures in thousands).

- air .....% absolute number: .....
- water .....% absolute number: .....
- soil .....% absolute number: .....
- packing material .....% absolute number: .....
- waste .....% absolute number: .....
- other, namely. ....% absolute number: .....

28. Please indicate which environmental measures your company expects to implement in the coming years. Please complete the following table for each individual measure. The data may be submitted on a separate sheet.

Name of measure	
Year of implementation	
Investment	(thousands)
Additional operating costs	(thousands)
Additional income	(thousands)
Perc. Construction	%
Perc. electro-mechanical	%
Perc. Other	%
General description	

REMARKS

29. Do you have any comments on the clarity of the phrasing of the questions?

.....

.....

.....

.....

30. Do you have any other remarks?

.....

.....

.....

.....

We thank you for completing this questionnaire.

Appendix 2. MIOW^{+} company report for 'Demostra'

K.F. van der Woerd
R.B. Dellink
I.A.W. van Rijn
J.J.M. Boelens

Instituut voor Milieuvraagstukken

Institute for Environmental Studies

This company report is fictitious and is merely aimed at illustrating the MIOW^{+}-method and computer program. Any resemblance with existing companies is purely coincidental.

December 1997

I V M
Institute for Environmental Studies
Vrije Universiteit
De Boelelaan 1115
1081 HV AMSTERDAM
The Netherlands

Preface

This report was made in period July - September 1995 by:
dr K.F. van der Woerd (business economist);

drs R. B. Dellink (business econometrician);

dr I.A.W. van Rijn (business economist);

drs J.J.M. Boelens (computer scientist).

During the study the authors obtained much information from Demostra Ltd. The authors would like to thank him for his fast and precise supply of information and his constructive criticism.

Naturally, contents and conclusions as expressed in this report remain the responsibility of the authors.

The contents of this report are confidential. Information on the report can only be obtained from the authors.

CONTENTS

1. Introduction

The MIOW$^+$-method is an instrument to present and analyse the financial consequences of future environmental measures for individual companies. To this end estimated additional environmental costs are compared to the current and expected financial situation without additional environmental measures. This means that MIOW$^+$ gives an opinion on the influences of the environmental costs on the continuity of business. The financial situation is characterised by means of a number of internal and external indicators. The weighted average of the internal indicators results in a score for Resilience and the average of the external indicators results in a score for Market Situation. The essence of the method is that the values for Resilience and Market Situation determine the possibility to absorb extra environmental costs internally, or to transfer the costs to clients.

For the individual indicators as well as for Resilience and Market Situation MIOW$^+$ uses scores: values are transferred to scores between 1 and 5, using fixed critical boundaries. A score of 1 indicates that the value of the indicator can be described as 'very bad'. Analogously, a score of 2 means 'bad', a score of 3 'reasonable', a score of 4 'good' and a score of 5 'very good'. The final score for the Resilience can be transformed into a 'red', 'orange' or 'green' zone. The final score for Market Situation can be transformed into similar zones with accompanying cost transfer percentages for the environmental costs. Table 1.1 gives the description of the zones that are used in MIOW$^+$, and the accompanying critical boundaries.

Table 1.1 Zones for Resilience and Market Situation

Resilience	Market Situation
score < 1.5	score < 2.5
unsafe or 'red'	cost transfer percentage = 0%
score 1.5 - 2.5	score 2.5 - 3.5
unsecure or 'orange'	cost transfer percentage = 25%
score > 2.5	score > 3.5
safe or 'green'	cost transfer percentage = 50%

For continuity of business Resilience should remain in the 'green' zone.

Chapter 2 discusses the results for the internal indicators and Resilience; chapter 3 discusses the external indicators and the Market Situation; chapter 4 is concerned with the international competition that serves as a background for the Market Situation; chapter 5 processes the environmental measures that are given by the company and presents the calculated environmental costs; in chapter 6 the actual financial capacity analysis takes place by analysing the effects of the environmental costs on Resilience; finally, the main conclusions are summarised in chapter 7.

2. Internal indicators and resilience

Table 1 presents an overview of the development of the internal indicators over the period 1991 to 1994. Moreover, the development of Resilience is presented, both for the short term (liquidity; indicators 1 and 2) and the long term (Solvency, rentability and activity; indicators 3 to 8).

Table 2.1. Internal indicators and Resilience.

Year	1991		1992		1993		1994		trend
	value	score	value	score	value	score	value	score	
1. Quick ratio	0.93	4	0.81	3	0.67	3	0.78	3	-
2. Current ratio	1.18	3	1.17	3	1.01	2	1.11	3	-
3. Solvency	0.39	4	0.40	4	0.43	4	0.41	4	-
4. Interest coverage	7.15	5	4.27	4	3.17	3	5.15	5	-
5. ROA	0.13	4	0.10	3	0.08	2	0.09	3	-
6. Profit margin	0.11	4	0.08	3	0.06	2	0.07	2	↓
7. Turnover	1.15	3	1.30	4	1,38	4	1.36	4	-
8. Capital intensity	0.42	2	0.40	3	0.42	2	0.41	2	-

Resilience	score	score	score	score	trend
W - short term	3.67	3.00	2.67	3.00	-
- long term	3.61	3.39	2.72	3.17	-

The following *conclusions* can be drawn:

Trends: Most internal indicators and Resilience are in the ‘green’ or safe zone. Continuity seems assured, but the score of "3" (reasonable) indicates that the margin is limited.

*Cyclical influences***:** The year 1993 was not a good year, after which limited recovery took place.

*Specific indicators***:** The Solvency indicators are good. No other extreme values.

3. External indicators and market situation

Table 3.1 presents an overview of the (average) Competition scores.

Table 3.1. Competition score.

Power of suppliers	3.08
Power of clients	4.00
Threat of substitute products	2.50
Threat of new entries	2.50
Market share biggest 4 suppliers	4.00
Total average	3.22

Table 3.2 presents the Market position both in the past and in the future. To avoid large variations in the results the average scores over the period 1991-1994 and 1995-1999 are also presented.

Table 3.2. Market position.

	Market growth		**Change in market share**		
Year	%	score	%	score	%-point
1991	-5.71	1	6.50	4	0.67
1992	-6.06	1	18.28	5	1.99
1993	3.23	5	-2.76	3	-0.35
1994	12.50	5	-8.12	2	-0.02
1995	11.11	5	2.36	3	0.27
1996	6.25	5	0.40	3	0.05
1997	2.35	4	1.87	3	0.22
1998	1.15	4	5.27	4	0.63
1999	2.27	4	3.81	3	0.49
Average 1991 - 1994		3.00		3.50	
Average 1995 - 1999		4.40		3.20	
Average total		3.78		3.33	
Total score Market position			3.56		

The score for Market Situation is the (unweighted) average of the total scores for Competition score and Market position. In this case: (3.22 + 3.56)/2 = **3.39**.

The following *conclusions* can be drawn:

Trends: Most individual indicators and the Competition score, the score for Market position and the score for Market Situation are between 3 (reasonable) and 4 (good). This indicates reasonable to good market expectations.

Specific indicators: The Power of clients and the concentration of suppliers score relatively high; the same goes for the expected market growth. Historical market growth scores very low for 1991 and 1992, but very high for 1993 and 1994.

Possibilities to transfer environmental costs: Based on a score for Market Situation of 3.39 it is expected that a cost transfer percentage of **25%** is realistic. The company will have to bear 75% of the costs itself.

4. International competition

The company exports 30% of its production. This indicates that international competition is reasonably important. Half of the foreign competitors are confronted with less strict environmental policies.

Conclusion:

The relative importance of export and the non-uniform environmental policies for half of the foreign competitors partially limit the possibilities to transfer the environmental costs. This supports the choice of the cost transfer percentage (25%) in chapter 3.

5. Environmental measures

The expected environmental measures confront the company with environmental investments as well as annual environmental costs. The expected environmental investments are added up over the period 1995 to 1999. The assumption is made that *all measures are new* and that none of the environmental investments concern replacement investments.

The (gross) total annual environmental costs consist of capital costs of the environmental investments plus additional operating costs minus additional income.

Total environmental investments 1995-1999: 4.2 million. On average, this is 22% of the depreciation costs over the period 1991 to 1994 and 21% of total investments for 1995-1999. These percentages indicate a reasonable to large effort.

Environmental costs 1999: The calculation in table 4 is based on investments being fully financed with long-term credit at the capital market rate of 8%. Given the good Solvency and reasonable rentability (see table 1) this should be possible.

Table 5.1. Environmental costs.

Year (x1000)	Total in-vestments	Environmental investments	Additional operating costs	Total annual costs	% of sales 1994	% of value added 1994	% of operating profit 19'94
1995	3,400	750	100	199	0.24%	0.84%	3.63%
1996	4,000	800	80	385	0.46%	1.62%	7.01%
1997	4,750	850	70	567	0.68%	2.39%	10.33%
1998	4,000	900	80	766	0.92%	3.22%	13.96%
1999	3,500	900	70	954	1.15%	4.02%	17.40%
Total	19,650	4,200	400				

6. Effects of environmental measures

The following calculation is based on the total package of environmental measures (annual costs 954,000) and will be compared to (long-term) Resilience in 1994. It is expected that the environmental measures have no direct influence on liquidity. Table 5 presents the effects of the (net) environmental costs on the internal indicators and Resilience, using 1994 as the base year. Furthermore, the results of the calculations are presented, assuming that none of the environmental costs can be transferred to the clients. In chapters 3 and 4 it was concluded that, given the Market Situation, 25% of the environmental costs can be transferred to clients. In the last two columns of table 5 the effects of this on the internal indicators and Resilience are presented.

Table 6.1. Effects of environmental measures.

Indicator	1994 base		1999 0% cost transfer		1999 25% cost transfer	
	value	score	value	score	value	score
1. Quick ratio	0.78	3	0.78	3	0.78	3
2. Current ratio	1.11	3	1.11	3	1.11	3
3. Solvency	0.41	4	0.38	4	0.39	4
4. Interest coverage	5.15	5	4.25	4	4.47	4
5. ROA	0.09	3	0.07	2	0.07	2
6. Profit margin	0.07	2	0.05	2	0.06	2
7. Turnover	1.36	4	1.28	4	1.30	4
8. Capital intensity	0.41	2	0.46	2	0.44	2
Resilience		3.17		2.78		2.78

Conclusion:

Resilience has decreased, but is still in the ‘green’ zone (larger than 2.5). The scores with and without possibilities to transfer the costs are identical. In other words, the possibilities to transfer the costs to clients do not decrease the financial effects on the company itself.

In principle these environmental measures can be borne.

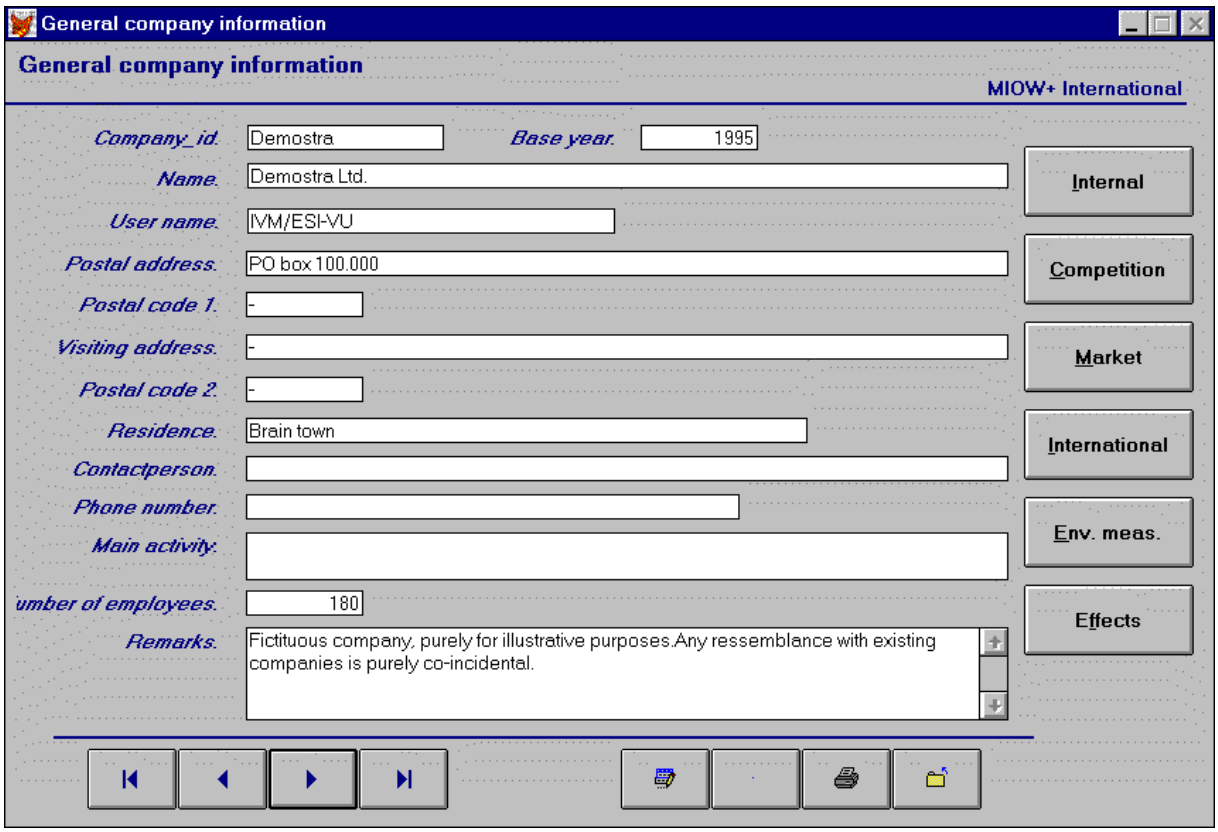
7. Summary and conclusions

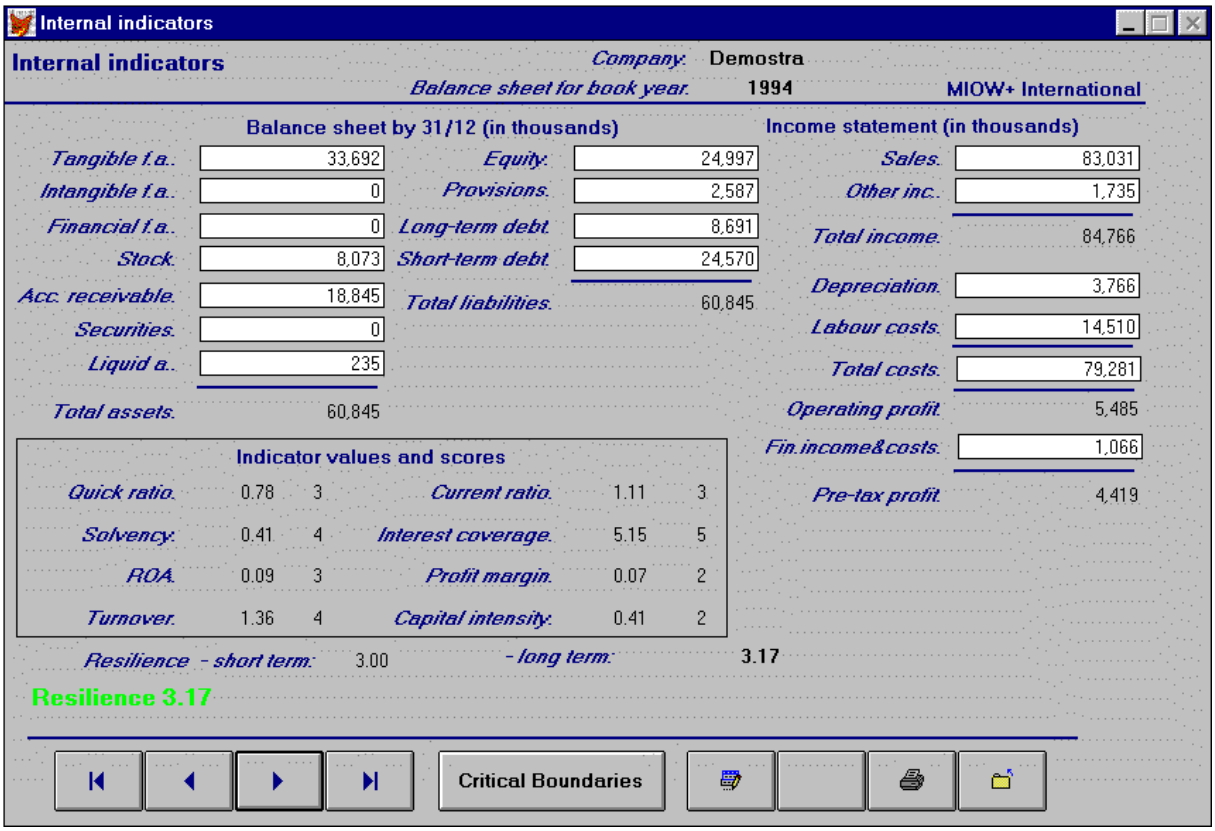
The MIOW$^+$ analysis indicates that the continuity of Demostra Ltd. is ensured, but that the margins are limited. The score for Resilience is in the safe or so-called ‘green’ zone. The score for Market Situation of Demostra lies between reasonable and good. The transfer of environmental costs to clients is partially possible; a cost transfer percentage is estimated at 25%.

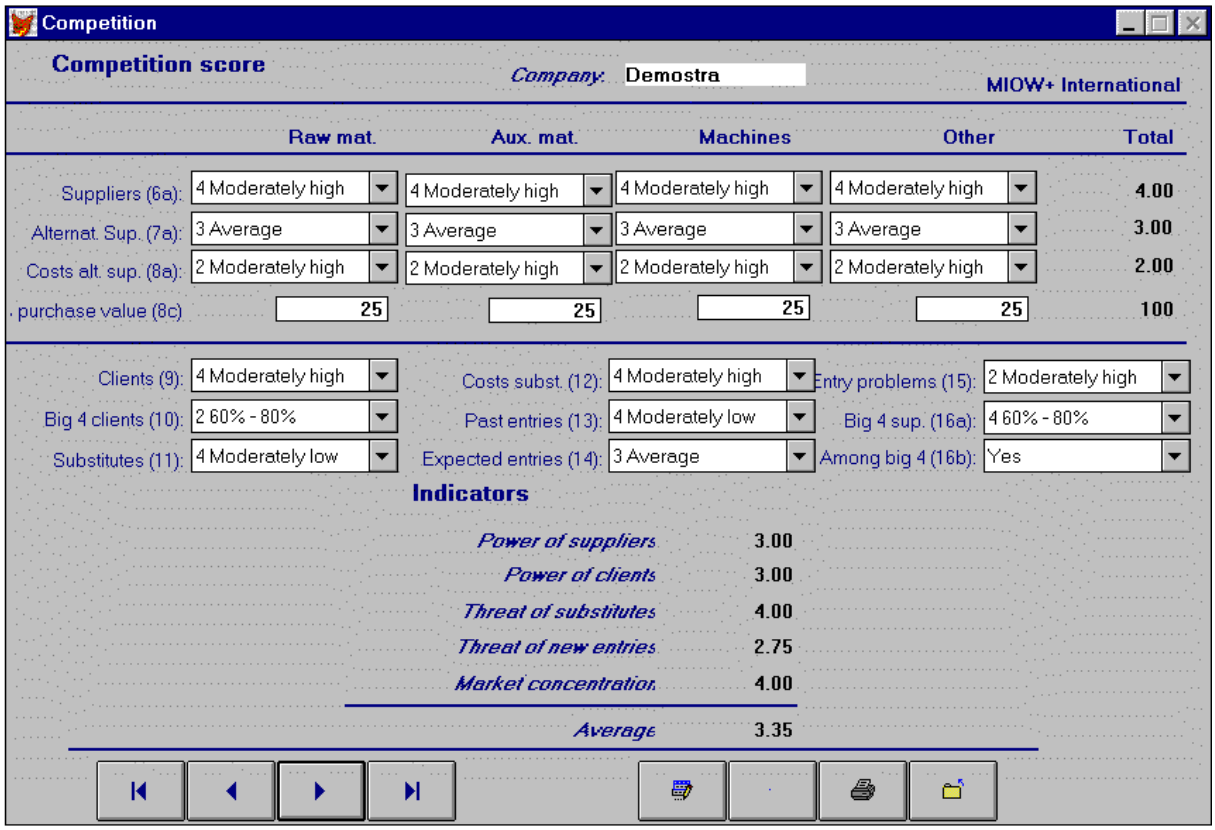
The (gross) annual environmental costs are estimated at 954 thousand. These costs do not significantly affect the Resilience of the company, both with and without possibilities to transfer the costs.

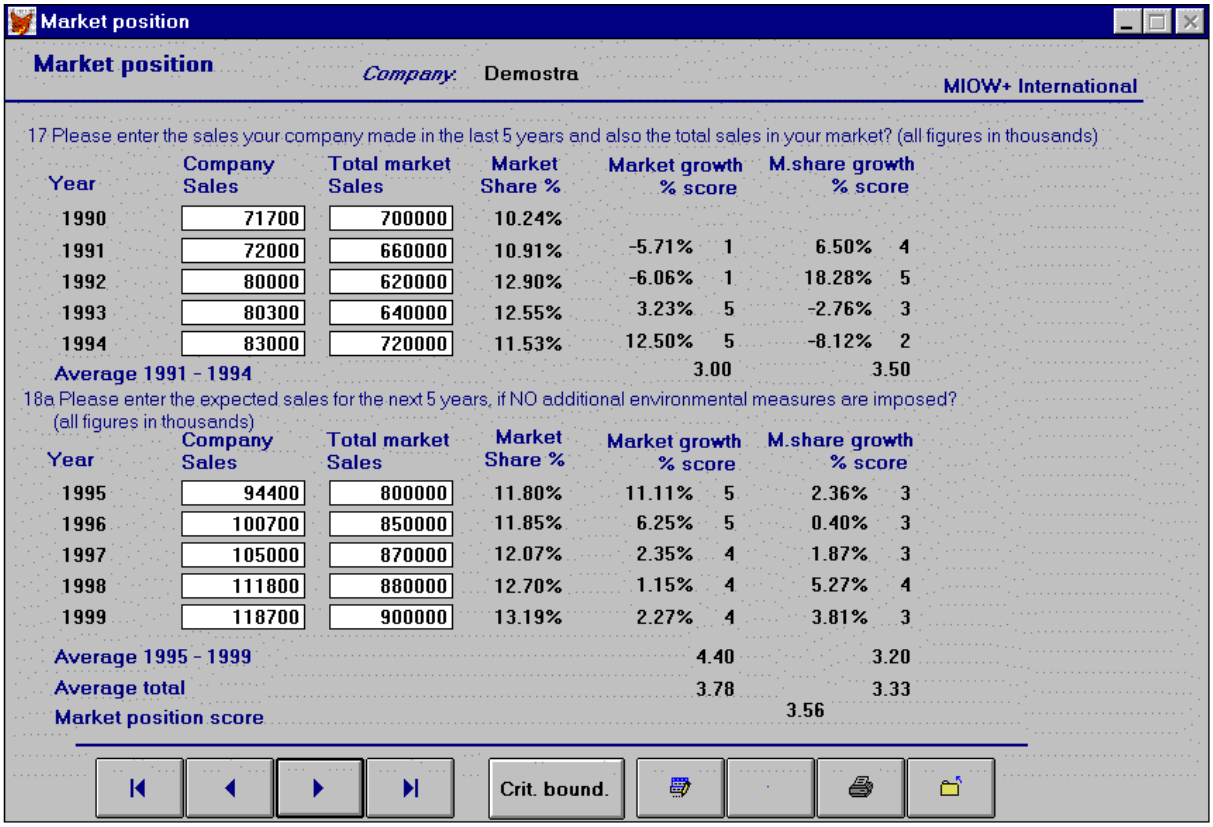
In principle, these environmental measures are bearable.

Appendix 3. MIOW^{+} window printouts




Internal indicators
Internal indicators
Company: Demostra
Balance sheet for book year: 1994
MIOW+ International
Balance sheet by 31/12 (in thousands)
Tangible f.a.. 33,692
Intangible f.a.. 0
Financial f.a.. 0
Stock. 8,073
Acc. receivable. 18,845
Securities. 0
Liquid a.. 235
Total assets. 60,845
Equity. 24,997
Provisions. 2,587
Long-term debt. 8,691
Short-term debt. 24,570
Total liabilities. 60,845
Income statement (in thousands)
Sales. 83,031
Other inc.. 1,735
Total income. 84,766
Depreciation. 3,766
Labour costs. 14,510
Total costs. 79,281
Operating profit. 5,485
Fin.income&costs. 1,066
Pre-tax profit. 4,419
Indicator values and scores
Quick ratio. 0.78 3
Solvency. 0.41 4
ROA. 0.09 3
Turnover. 1.36 4
Current ratio. 1.11 3
Interest coverage. 5.15 5
Profit margin. 0.07 2
Capital intensity. 0.41 2
Resilience - short term: 3.00
- long term: 3.17
Resilience 3.17
Critical Boundaries


Competition
Competition score
Company: Demostra
MIOW+ International
Raw mat. Aux. mat. Machines Other Total
Suppliers (6a): 4 Moderately high 4 Moderately high 4 Moderately high 4 Moderately high 4.00
Alternat. Sup. (7a): 3 Average 3 Average 3 Average 3 Average 3.00
Costs alt. sup. (8a): 2 Moderately high 2 Moderately high 2 Moderately high 2 Moderately high 2.00
purchase value (8c) 25 25 25 25 100
Clients (9): 4 Moderately high
Big 4 clients (10): 2 60% - 80%
Substitutes (11): 4 Moderately low
Costs subst. (12): 4 Moderately high
Past entries (13): 4 Moderately low
Expected entries (14): 3 Average
Entry problems (15): 2 Moderately high
Big 4 sup. (16a): 4 60% - 80%
Among big 4 (16b): Yes
Indicators
Power of suppliers 3.00
Power of clients 3.00
Threat of substitutes 4.00
Threat of new entries 2.75
Market concentration 4.00
Average 3.35



Market position

Market position *Company:* Demostra MIOW+ International

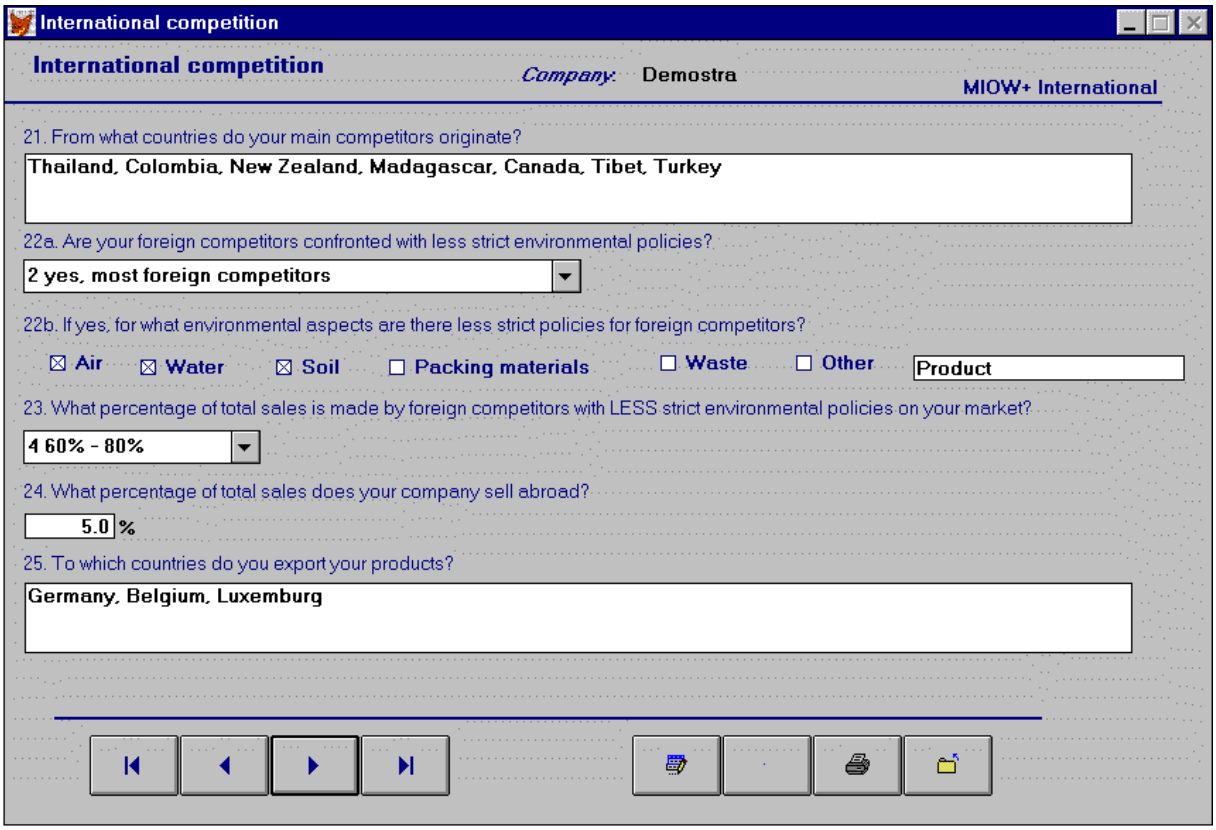
17 Please enter the sales your company made in the last 5 years and also the total sales in your market? (all figures in thousands)

Year	Company Sales	Total market Sales	Market Share %	Market growth % score		M.share growth % score	
1990	71700	700000	10.24%				
1991	72000	660000	10.91%	-5.71%	1	6.50%	4
1992	80000	620000	12.90%	-6.06%	1	18.28%	5
1993	80300	640000	12.55%	3.23%	5	-2.76%	3
1994	83000	720000	11.53%	12.50%	5	-8.12%	2
Average 1991 - 1994					3.00		3.50

18a Please enter the expected sales for the next 5 years, if NO additional environmental measures are imposed? (all figures in thousands)

Year	Company Sales	Total market Sales	Market Share %	Market growth % score		M.share growth % score	
1995	94400	800000	11.80%	11.11%	5	2.36%	3
1996	100700	850000	11.85%	6.25%	5	0.40%	3
1997	105000	870000	12.07%	2.35%	4	1.87%	3
1998	111800	880000	12.70%	1.15%	4	5.27%	4
1999	118700	900000	13.19%	2.27%	4	3.81%	3
Average 1995 - 1999					4.40		3.20
Average total					3.78		3.33
Market position score						3.56	

Crit. bound.



International competition

International competition *Company:* Demostra MIOW+ International

21. From what countries do your main competitors originate?

Thailand, Colombia, New Zealand, Madagascar, Canada, Tibet, Turkey

22a. Are your foreign competitors confronted with less strict environmental policies?

2 yes, most foreign competitors

22b. If yes, for what environmental aspects are there less strict policies for foreign competitors?

☒ Air ☒ Water ☒ Soil ☐ Packing materials ☐ Waste ☐ Other Product

23. What percentage of total sales is made by foreign competitors with LESS strict environmental policies on your market?

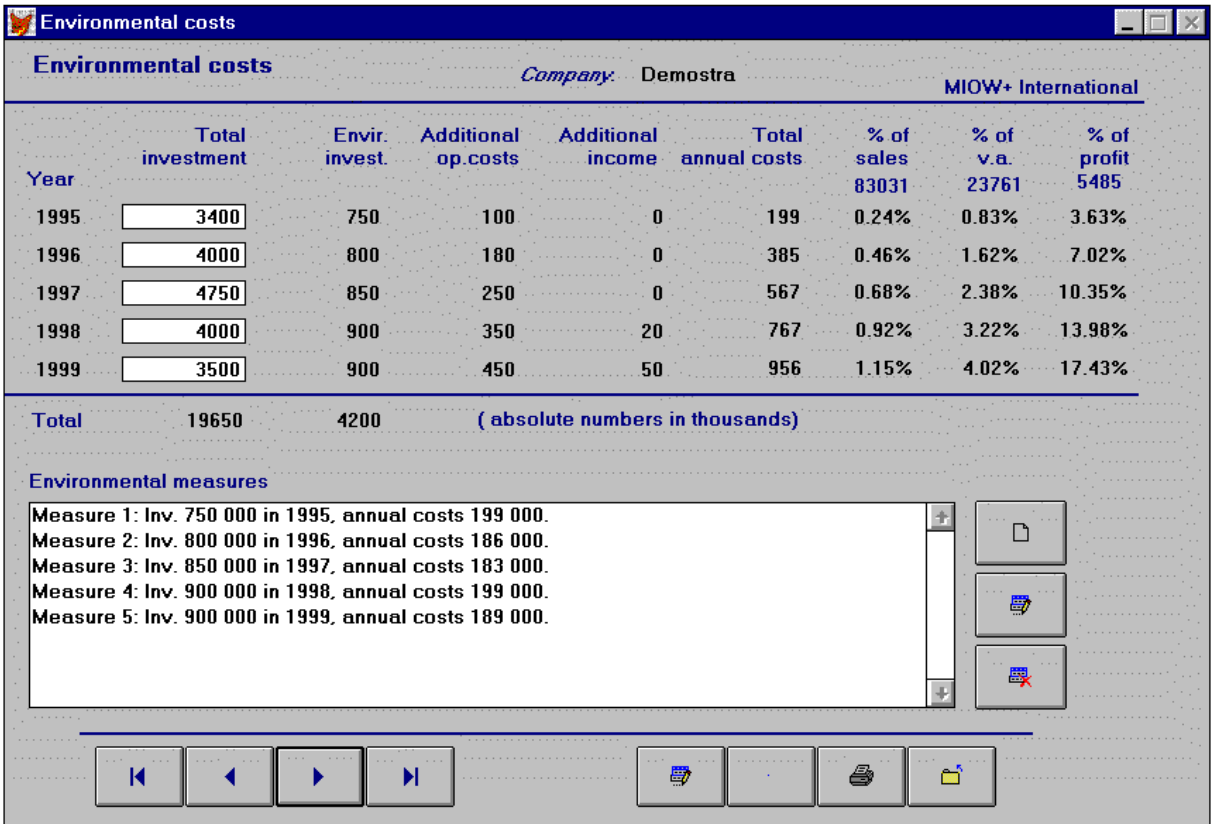
4 60% - 80%

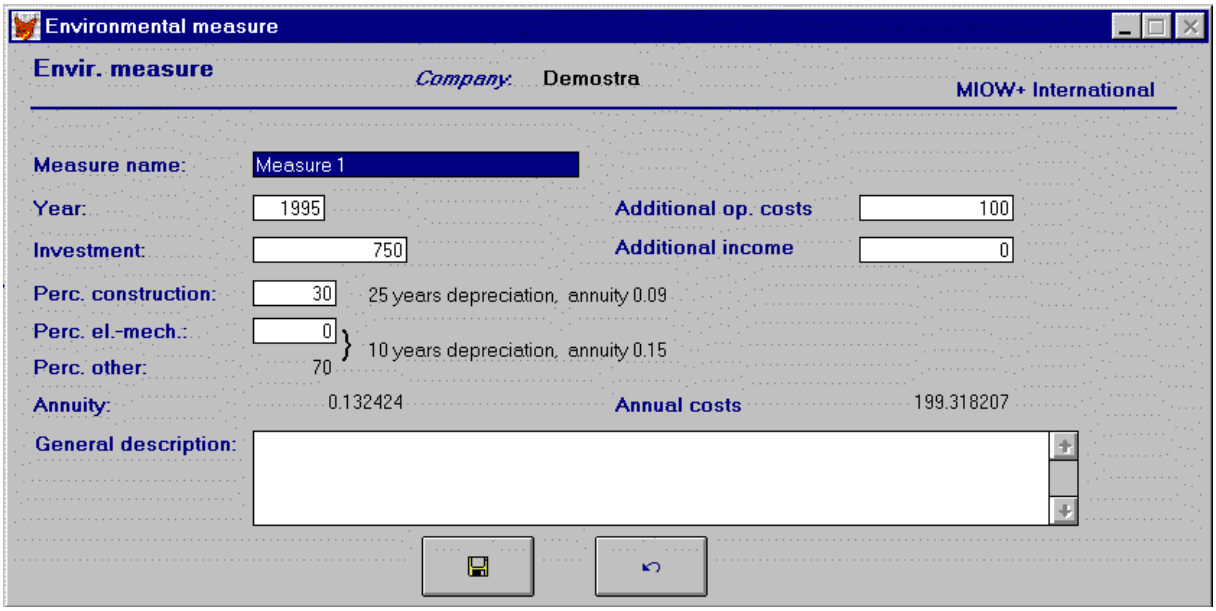
24. What percentage of total sales does your company sell abroad?

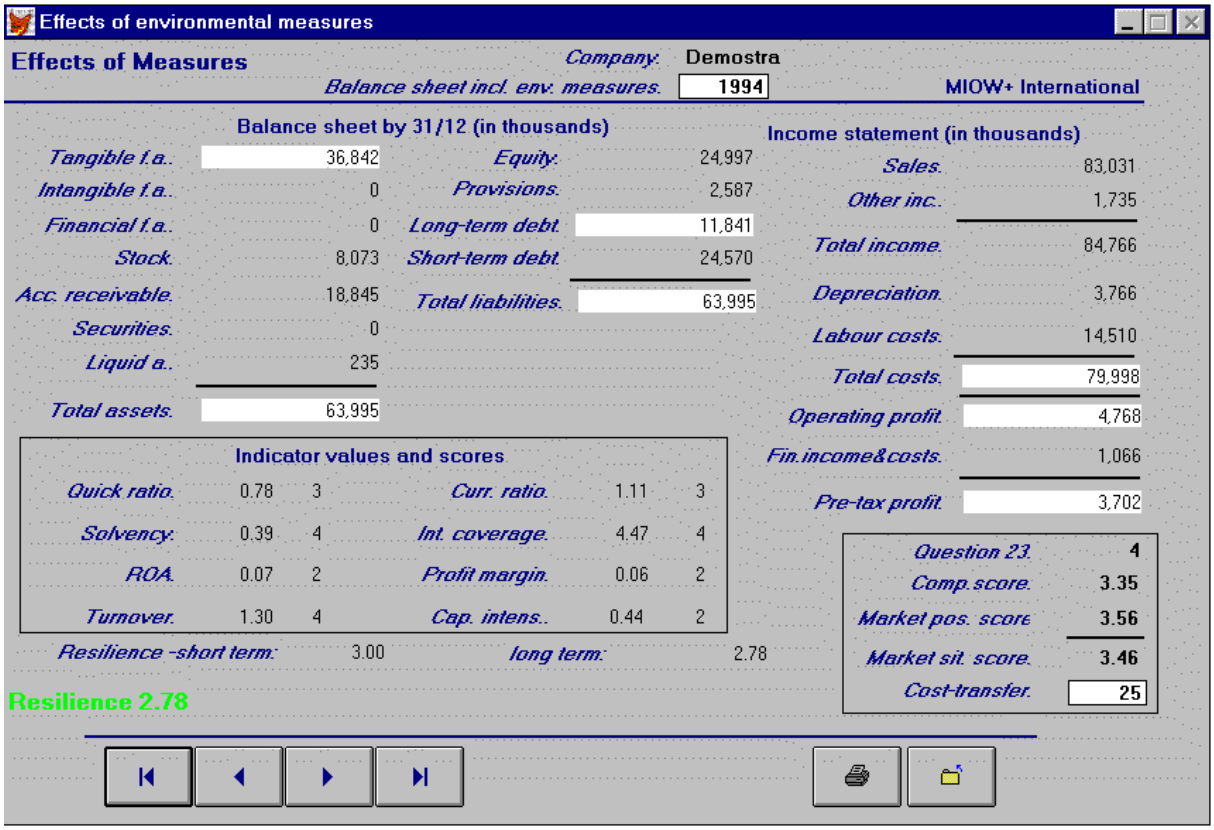
5.0 %

25. To which countries do you export your products?

Germany, Belgium, Luxemburg


Environmental costs
Environmental costs
Company: Demostra
MIOW+ International
Year
Total investment
Envir. invest.
Additional op.costs
Additional income
Total annual costs
% of sales
% of v.a.
% of profit
83031
23761
5485
1995 3400 750 100 0 199 0.24% 0.83% 3.63%
1996 4000 800 180 0 385 0.46% 1.62% 7.02%
1997 4750 850 250 0 567 0.68% 2.38% 10.35%
1998 4000 900 350 20 767 0.92% 3.22% 13.98%
1999 3500 900 450 50 956 1.15% 4.02% 17.43%
Total 19650 4200
(absolute numbers in thousands)
Environmental measures
Measure 1: Inv. 750 000 in 1995, annual costs 199 000.
Measure 2: Inv. 800 000 in 1996, annual costs 186 000.
Measure 3: Inv. 850 000 in 1997, annual costs 183 000.
Measure 4: Inv. 900 000 in 1998, annual costs 199 000.
Measure 5: Inv. 900 000 in 1999, annual costs 189 000.


Environmental measure
Envir. measure
Company: Demostra
MIOW+ International
Measure name: Measure 1
Year: 1995
Investment: 750
Perc. construction: 30
Perc. el.-mech.: 0
Perc. other: 70
25 years depreciation, annuity 0.09
10 years depreciation, annuity 0.15
Annuity: 0.132424
Additional op. costs 100
Additional income 0
Annual costs 199.318207
General description:


Effects of environmental measures
Effects of Measures
Company: Demostra
Balance sheet incl. env. measures. 1994
MIOW+ International
Balance sheet by 31/12 (in thousands)
Tangible f.a.. 36,842
Intangible f.a.. 0
Financial f.a.. 0
Stock. 8,073
Acc. receivable. 18,845
Securities. 0
Liquid a.. 235
Total assets. 63,995
Equity. 24,997
Provisions. 2,587
Long-term debt. 11,841
Short-term debt. 24,570
Total liabilities. 63,995
Income statement (in thousands)
Sales. 83,031
Other inc.. 1,735
Total income. 84,766
Depreciation. 3,766
Labour costs. 14,510
Total costs. 79,998
Operating profit. 4,768
Fin.income&costs. 1,066
Pre-tax profit. 3,702
Indicator values and scores
Quick ratio. 0.78 3
Solvency. 0.39 4
ROA. 0.07 2
Turnover. 1.30 4
Curr. ratio. 1.11 3
Int. coverage. 4.47 4
Profit margin. 0.06 2
Cap. intens.. 0.44 2
Resilience -short term: 3.00
long term: 2.78
Resilience 2.78
Question 23. 4
Comp.score. 3.35
Market pos. score 3.56
Market sit. score. 3.46
Cost-transfer. 25